REMARKS

This is a full and timely response to the non-final Office Action mailed September 16, 2003 (Paper No. 5). Upon entry of the attached amendments, claims 1-47 are pending in the application. Claims 1, 6, 14, 17, 26, 31, 46, and 47 have been amended. The subject matter of the amended claims is supported in the schematics, plots, and flow diagrams, of at least FIGs. 6-15 and the related detailed description. Consequently, Applicant submits no new matter is added to the present application.

The following remarks address each rejection, and will distinguish Applicant's claimed systems and methods from the cited art of record. Accordingly, reconsideration and allowance of the application and presently pending claims 1-47 are respectfully requested.

I. Allowable Subject Matter - Claims 8, 20, 25, 28, 36 and 37

Applicant thanks the Examiner for indicating that the subject matter in dependent claims 8, 20, 25, 28, 36 and 37 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant does not elect to amend claims 8, 20, 25, 28, 36 and 37 in the suggested manner at this time, however, as there are other patentable distinctions in Applicant's independent claims that do not appear in the cited references.

II. Claim Rejections under 35 U.S.C. §103(a) - Claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47

The Office Action indicates that claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent RE35423 to Adams *et al.*, hereafter *Adams*, in view of U.S. Patent No. 6,580,501 to Cannon, hereafter *Cannon*.

A. Claims 1-5 and 11-13

Applicant respectfully traverses the rejection of claims 1-5 and 11-13 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

In order for a claim to be properly rejected under 35 U.S.C. §103, the combined teachings of the prior art references must suggest all features of the claimed invention to one of ordinary skill in the art. See, *e.g.*, *In Re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981). The proposed combination fails to suggest all features of the claimed invention.

Applicant's independent claim 1 is exemplary. For convenience of analysis, independent claim 1, as amended, is repeated below in its entirety.

> 1. A method for adapting test thresholds, comprising the following steps:
> acquiring location information for a plurality of solder joints on a printed-circuit device;
> obtaining information indicative of the variation in distance between a mounting surface of the printed-circuit device and a printed-circuit board;
> recording a measurement of a physical property of a plurality of solder joints used to couple the printed-circuit device to the printed-circuit board;
> ***analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint responsive to variation in distance between the mounting surface of the printed-circuit device and the printed-circuit board***; and
> ***setting at least one threshold responsive to the range***.

(Applicant's independent claim 1 - *Emphasis added.*)

The cited art of record fails to disclose, teach, or suggest at least the emphasized elements of pending claim 1 as shown above. Consequently, claim 1 is allowable.

Specifically, the system disclosed in *Adams* fails to disclose, teach, or suggest Applicant's claimed method for adapting test thresholds comprising the limitation of "***analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint responsive to variation in distance between the mounting surface of the printed-circuit device and the printed-circuit board.***" In this regard, the statement of the rejection of claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47 alleges that *Adams* teaches a method for adapting test thresholds that includes

Applicant's acquiring and recording limitations, as well as the limitation of estimating a range of acceptable measurements of respective solder joints. The statement of the rejection alleges that column 12, lines 12-32 of *Adams* teaches Applicant's claimed estimating step. (See, Office Action, item 2, page 2, paper no. 5.) Applicant disagrees.

Adams apparently describes a system that separately compares measured parameters of individual solder joints using a set of rules for parameters consistent with acceptable solder joints. That is, each measured parameter of each individual solder joint is compared with a pre-established criteria for the particular electronic component package of interest. In the Abstract, *Adams* indicates that (solder joint) measurements are compared to predetermined standards corresponding to acceptable quality standards. In column 12, *Adams* adds that the pre-established criteria and the measurements may be readily chosen and stored in a library. In this way, measurements and pass/fail criteria can be customized to identify defects in electronic component types susceptible to particular solder joint defects. Thus, *Adams* can be said to teach adjustment of pass/fail criteria based on solder joint type. Significantly, *Adams* is silent regarding details of how test thresholds are determined to meet acceptable quality standards. *Adams* is also silent regarding varying pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board.

In contrast with the system and method apparently described in *Adams*, Applicant's claimed method for adapting test thresholds comprises "***analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint responsive to variation in distance between the mounting surface of the printed-circuit device and the printed-circuit board***." As shown above, the system and method apparently disclosed in *Adams* applies a pre-determined pass/fail criteria to individual solder joints based on their type (*i.e.*, electronic package type). Applying a pre-determined pass/fail criteria to a solder joint measurement does not teach analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint. For at least this reason, *Adams* does not disclose, teach, or suggest the emphasized limitation of claim 1.

As further shown above, the system and method apparently disclosed in *Adams* is silent regarding varying the pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board near the solder joint under test. Applying a pre-determined pass/fail criteria to a solder joint measurement based on the solder joint type does not teach Applicant's claimed limitation for at least the additional reason that *Adams* does not disclose, teach, or suggest calculating a range of acceptable measurements for each respective neighbor solder joint responsive to variation in distance between the mounting surface of the printed-circuit device and the printed-circuit board.

Because *Adams* does not disclose, teach, or suggest Applicant's limitation of "analyzing ***recorded measurements of a set of neighbor solder joints . . .***" Adams cannot disclose, teach, or suggest Applicant's claimed limitation of "***setting at least one threshold responsive to the range.***" Thus, for at least these reasons, *Adams* does not disclose, teach, or suggest the emphasized limitations of claim 1.

Cannon does not remedy the failure of Adams to disclose, teach, or suggest the emphasized limitations of claim 1. *Cannon*, like *Adams*, describes methods of individual joint inspection. Individual joint inspection does not disclose, teach, or suggest analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint.

Cannon apparently describes a device that enables the visual inspection of solder joints along an edge of a surface mount device (SMD), ball-grid array (BGA), chip-scale package (CSP), or flip chip (FC) component. *Cannon's* optical inspection device can be used to measure the distance between a component and a printed circuit board along an edge of a BGA, CSP, or FC. *Cannon* mentions that the distance or the standoff height of the component underside from the printed circuit board surface can be a further measure of the quality of the soldered joint or at least of sufficient melting of the solder during the soldering process. (See *Cannon*, column 6, lines 54-59.)

Significantly, *Cannon* is silent regarding analyzing recorded measurements of a set of neighbor solder joints to calculate a range of acceptable measurements for each respective neighbor solder joint. In this regard, *Cannon*, states that when evaluating the quality of a solder joint the surface of the solder joint, flux residues and

geometric form and particularly any crowning of a solder joint associated with a BGA device can be observed. (See *Cannon*, column 6, lines 47-54.)

In fact, *Cannon* suggests a method of BGA solder joint inspection that teaches away from Applicant's claimed limitation. Specifically, *Cannon* states, "it is not absolutely necessary for all the solder joints to be checked here; instead, a comparatively reliable finding on the overall quality of the soldering can be obtained simply by checking the corner solder points." (See Cannon, column 6, lines 43-47.) Corner solder points are not neighbor solder joints. Thus, checking the quality of the corner solder points teaches away from Applicant's limitation of analyzing recorded measurements of neighbor solder joints.

For at least the reasons described above, *Cannon* fails to remedy the failure of *Adams* to disclose, teach, or suggest each limitation of Applicant's claim 1. Consequently, claim 1 is allowable for at least the reason that the proposed combination of references does not disclose, teach, or suggest Applicants' emphasized limitations. Accordingly, the rejection of claim 1 should be withdrawn.

Because independent claim 1 is allowable, dependent claims 2-14, which depend directly or indirectly from allowable claim 1, are also allowable. *See In re Fine*, 837, F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Accordingly, Applicant respectfully requests that the rejection of claims 1-5 and 11-13 be withdrawn.

B. Claims 14-16, 18, 23, and 24

Applicant respectfully traverses the rejection of claims 14-16, 18, 23, and 24 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

Applicant's independent claim 14 is exemplary. For convenience of analysis, independent claim 14, as amended, is repeated below in its entirety.

> 14. A method for identifying solder joint defects, comprising the steps of:
> recording a measurement associated with a plurality of solder joints on a printed-circuit device;
> ***analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a***

> ***printed-circuit device and a printed-circuit board coupled by the solder joints***;
> ***comparing the recorded measurement with the expected value for the plurality of solder joints to generate a respective error value***; and
> ***identifying defective solder joints by applying an error value outlier analysis to the plurality of error values***.

(Applicant's independent claim 14 - *Emphasis added.*)

The cited art of record fails to disclose, teach, or suggest at least the emphasized elements of pending claim 14 as shown above. Consequently, claim 14 is allowable.

Specifically, the system disclosed in *Adams* fails to disclose, teach, or suggest Applicant's claimed method for identifying solder joint defects comprising the limitation of "***analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed-circuit device and a printed-circuit board coupled by the solder joints***." In this regard, the statement of the rejection of claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47 alleges that *Adams* teaches a method for adapting test thresholds that includes Applicant's recording limitations, as well as the limitation of estimating a range of acceptable measurements of respective solder joints. The statement of the rejection alleges that column 12, lines 12-32 of *Adams* teaches Applicant's claimed estimating step. (See, Office Action, item 2, page 2, paper no. 5.) Applicant disagrees.

As shown above regarding the patentability of Applicant's claim 1, *Adams* apparently describes a system that separately compares measured parameters of individual solder joints using a set of rules for parameters consistent with acceptable solder joints. Measurements and pass/fail criteria can be customized to identify defects in electronic component types susceptible to particular solder joint defects. Thus, *Adams* can be said to teach adjustment of pass/fail criteria based on solder joint type. Significantly, *Adams* is silent regarding details of how test thresholds are determined to meet acceptable quality standards. *Adams* is also silent regarding varying pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board.

In contrast with the system and method apparently described in *Adams*, Applicant's claimed method for identifying solder joint defects comprises the limitation of "***analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed-circuit device and a printed-circuit board coupled by the solder joints***." As shown above, the system and method apparently disclosed in *Adams* applies a pre-determined pass/fail criteria to individual solder joints based on their type (*i.e.*, electronic package type). Applying a pre-determined pass/fail criteria to a solder joint measurement based on the type of joint does not teach analyzing recorded measurements of a set of neighbor solder joints to calculate an expected value for the measurement associated with each of the solder joints. The system and method apparently disclosed in *Adams* does not adapt and account for component warp or tilt across the surface of the device. The application of an automated pass/fail criteria based solely on solder joint type for at least BGA, CSP, and FC packages results in a pass/fail criteria that misidentifies acceptable solder joints as defects. For at least this reason, *Adams* does not disclose, teach, or suggest the emphasized limitation of claim 14.

As further shown above, the system and method apparently disclosed in *Adams* is silent regarding varying the pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board near the solder joint under test. Applying a pre-determined pass/fail criteria to a solder joint measurement based on the solder joint type does not teach Applicant's claimed limitation for at least the additional reason that *Adams* does not disclose, teach, or suggest calculating an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed-circuit device and a printed-circuit board coupled by the solder joints.

Because *Adams* does not disclose, teach, or suggest Applicant's limitation of "***analyzing the measurement associated with each of a set of neighboring solder joints . . .***," Adams cannot disclose, teach, or suggest Applicant's claimed limitation of "***comparing the recorded measurement with the expected value for the plurality of solder joints to generate a respective error value***." Moreover, because *Adams*

does not disclose, teach, or suggest Applicant's limitation of "***analyzing the measurement associated with each of a set of neighboring solder joints . . .***," Adams cannot disclose, teach, or suggest Applicant's claimed limitation of "***identifying defective solder joints by applying an error value outlier analysis to the plurality of error values***." Thus, for at least these reasons, *Adams* does not disclose, teach, or suggest the emphasized limitations of claim 14.

Concerning, Applicant's claimed limitation of "***identifying defective solder joints by applying an error value outlier analysis to the plurality of error values***," the statement of the rejection alleges that Adams teaches this limitation in column 12, lines 33-52 and column 13, lines 16-26. Applicant disagrees.

What *Adams* describes is calculating an average grey level in the barrel of a single solder joint and normalizing the average grey level against a step wedge imaged grey level. If the difference between minimum and maximum grey levels exceeds a threshold value, a defect is identified. *Adams* does not calculate Applicant's claimed error values because Adams does not "***calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed-circuit device and a printed-circuit board coupled by the solder joints***." Consequently, *Adams* cannot perform an outlier analysis to the plurality of error values.

Cannon does not remedy the failure of Adams to disclose, teach, or suggest the emphasized limitations of claim 14. *Cannon*, like *Adams*, describes methods of individual joint inspection. Individual joint inspection does not disclose, teach, or suggest analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed circuit device and a printed circuit board.

Cannon apparently describes a device that enables the visual inspection of solder joints along an edge of a SMD, BGA, CSP, or FC component. *Cannon* mentions that the distance or the standoff height of the component underside from the printed circuit board surface can be a further measure of the quality of the soldered joint or at least of sufficient melting of the solder during the soldering process. (See *Cannon*, column 6, lines 54-59.)

Significantly, *Cannon* is silent regarding analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement. In this regard, *Cannon*, states that when evaluating the quality of a solder joint the surface of the solder joint, flux residues and geometric form and particularly any crowning of a solder joint associated with a BGA device can be observed. (See *Cannon*, column 6, lines 47-54.)

In fact, *Cannon* suggests a method of BGA solder joint inspection that teaches away from Applicant's claimed limitation. Specifically, *Cannon* states, "it is not absolutely necessary for all the solder joints to be checked here; instead, a comparatively reliable finding on the overall quality of the soldering can be obtained simply by checking the corner solder points." (See Cannon, column 6, lines 43-47.) Corner solder points are not neighbor solder joints. Thus, checking the quality of the corner solder points teaches away from Applicant's limitation of analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement.

Moreover, Cannon fails to disclose, teach, or suggest "***comparing the recorded measurement with the expected value for the plurality of solder joints to generate a respective error value***;" and "***identifying defective solder joints by applying an error value outlier analysis to the plurality of error values***."

For at least the reasons described above, *Cannon* fails to remedy the failure of *Adams* to disclose, teach, or suggest each limitation of Applicant's claim 14. Consequently, claim 14 is allowable for at least the reason that the proposed combination of references does not disclose, teach, or suggest Applicants' emphasized limitations. Accordingly, the rejection of claim 14 should be withdrawn.

Because independent claim 14 is allowable, dependent claims 15-25, which depend directly or indirectly from allowable claim 14, are also allowable. *See In re Fine, supra.* Accordingly, Applicant respectfully requests that the rejection of claims 14-16, 18, 23, and 24 be withdrawn.

C. Claims 26, 27, 29, and 30

Applicant respectfully traverses the rejection of claims 26, 27, 29, and 30 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

Applicant's independent claim 26 is exemplary. For convenience of analysis, independent claim 26, as amended, is repeated below in its entirety.

> 26. An improved solder-joint inspection system, comprising:
>
> means for measuring at least one characteristic of a plurality of solder joints located within a select area of a printed-circuit device;
>
> ***means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device***; and
>
> ***means for formulating an error value as a function of the measured characteristic and the expected value for the plurality of solder joints***.

(Applicant's independent claim 26 - *Emphasis added.*)

The cited art of record fails to disclose, teach, or suggest at least the emphasized elements of pending claim 26 as shown above. Consequently, claim 26 is allowable.

Specifically, the system disclosed in *Adams* fails to disclose, teach, or suggest Applicant's claimed improved solder-joint inspection system comprising "***means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device***;" and "***means for formulating an error value as a function of the measured characteristic and the expected value for the plurality of solder joints***." In this regard, the statement of the rejection of claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47 alleges that *Adams* teaches Applicant's claimed means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of a second characteristic of a plurality of solder joints. The statement of the rejection

alleges that column 12, lines 12-32 of *Adams* teaches Applicant's claimed means for computing. (See, Office Action, item 2, page 3, paper no. 5.) Applicant disagrees. The statement of the rejection further alleges that *Adams* teaches Applicant's claimed means for formulating an error value as a function of the measured characteristic and the expected value for the plurality of solder joints. The statement of the rejection alleges that column 12, lines 33-52 and column 13, lines 16-26 of *Adams* teaches Applicant's claimed means for formulating an error value. (See, Office Action, item 2, page 4, paper no. 5.) Applicant disagrees.

As shown above regarding the patentability of Applicant's claim 1, *Adams* apparently describes a system that separately compares measured parameters of individual solder joints using a set of rules for parameters consistent with acceptable solder joints. *Adams* adjusts pass/fail criteria based on solder joint type. Significantly, *Adams* is silent regarding details of how test thresholds are determined to meet acceptable quality standards. *Adams* is also silent regarding varying pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board.

In contrast with the system and method apparently described in *Adams*, Applicant's claimed solder-joint inspection system comprises "***means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device***." As shown above, the system and method apparently disclosed in *Adams* applies a pre-determined pass/fail criteria to individual solder joints based on their type (*i.e.*, electronic package type). Applying a pre-determined pass/fail criteria to a solder joint measurement based on the type of joint does not teach computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board. The system and method apparently disclosed in *Adams* does not adapt and account for component warp or tilt across the surface of the device. The application of an automated pass/fail criteria based solely on solder joint type for at least BGA, CSP, and FC packages results in a pass/fail criteria that misidentifies acceptable solder joints as defects. For at least this reason, *Adams* does not disclose, teach, or suggest the emphasized limitation of claim 26.

As further shown above, the system and method apparently disclosed in *Adams* is silent regarding varying the pass/fail criteria of individual solder joints responsive to variation in distance between the mounting surface of a printed circuit device and the printed circuit board near the solder joint under test. Applying a pre-determined pass/fail criteria to a solder joint measurement based on the solder joint type does not teach Applicant's claimed limitation for at least the additional reason that *Adams* does not disclose, teach, or suggest "***means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device***.".

Because *Adams* does not disclose, teach, or suggest Applicant's limitation of "***means for computing an expected value for the measured characteristic for each of the plurality of solder joints . . .***," Adams cannot disclose, teach, or suggest Applicant's claimed limitation of "***means for formulating an error value as a function of the measured characteristic and the expected value for the plurality of solder joints***." Thus, for at least these reasons, *Adams* does not disclose, teach, or suggest the emphasized limitations of claim 26.

Cannon does not remedy the failure of Adams to disclose, teach, or suggest the emphasized limitations of claim 26. *Cannon*, like *Adams*, describes methods of individual joint inspection. Individual joint inspection does not disclose, teach, or suggest analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement associated with each of the solder joints that accounts for acceptable variance in the distance between the mounting surfaces of a printed circuit device and a printed circuit board.

Cannon apparently describes a device that enables the visual inspection of solder joints along an edge of a SMD, BGA, CSP, or FC component. *Cannon* mentions that the distance or the standoff height of the component underside from the printed circuit board surface can be a further measure of the quality of the soldered joint or at least of sufficient melting of the solder during the soldering process. (See *Cannon*, column 6, lines 54-59.)

Significantly, *Cannon* is silent regarding analyzing the measurement associated with each of a set of neighboring solder joints to calculate an expected value for the measurement. In this regard, *Cannon*, states that when evaluating the

quality of a solder joint the surface of the solder joint, flux residues and geometric form and particularly any crowning of a solder joint associated with a BGA device can be observed. (See *Cannon*, column 6, lines 47-54.)

In fact, *Cannon* suggests a method of BGA solder joint inspection that teaches away from Applicant's claimed limitation. Specifically, *Cannon* states, "it is not absolutely necessary for all the solder joints to be checked here; instead, a comparatively reliable finding on the overall quality of the soldering can be obtained simply by checking the corner solder points." (See *Cannon*, column 6, lines 43-47.) Corner solder points are not neighbor solder joints. Thus, checking the quality of the corner solder points teaches away from Applicant's claimed means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device.

Moreover, *Cannon* fails to disclose, teach, or suggest "***means for computing an expected value for the measured characteristic for each of the plurality of solder joints that varies as a function of distance between the mounting surface of the printed-circuit device and a printed-circuit board over the select area of the printed circuit device.***" For at least the reasons described above, *Cannon* fails to remedy the failure of *Adams* to disclose, teach, or suggest each limitation of Applicant's claim 26. Consequently, claim 26 is allowable for at least the reason that the proposed combination of references does not disclose, teach, or suggest Applicants' emphasized limitations. Accordingly, the rejection of claim 26 should be withdrawn.

Because independent claim 26 is allowable, dependent claims 27-30, which depend directly or indirectly from allowable claim 26, are also allowable. *See In re Fine*, *supra*. Accordingly, Applicant respectfully requests that the rejection of claims 26, 27, 29, and 30 be withdrawn.

D. Claims 31, 32, 35, 38,40, 43, 44, and 47

Applicant respectfully traverses the rejection of claims 31, 32, 35, 38,40, 43, 44, and 47 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

Applicant's independent claim 31 is exemplary. For convenience of analysis, independent claim 31, as amended, is repeated below in its entirety.

> 31. A solder-joint defect analysis detection program stored on a computer-readable medium, comprising:
> logic configured to record at least one characteristic of a plurality of solder joints located within a select area of a printed-circuit device;
> ***logic configured to determine an expected value for the at least one characteristic for the plurality of solder joints responsive to low frequency change in a solder joint characteristics across the device***;
> ***logic configured to generate an error value from a mathematical combination of the expected value and the recorded characteristic for the plurality of solder joints on the printed-circuit device***; and
> ***logic configured to identify error value outliers***.

(Applicant's independent claim 31 - *Emphasis added.*)

The cited art of record fails to disclose, teach, or suggest at least the emphasized elements of pending claim 31 as shown above. Consequently, claim 31 is allowable.

Specifically, the system disclosed in *Adams* fails to disclose, teach, or suggest Applicant's claimed solder-joint defect analysis detection program comprising "***logic configured to determine an expected value for the at least one characteristic for the plurality of solder joints responsive to low frequency change in a solder joint characteristics across the device***." In this regard, the statement of the rejection of claims 1-5, 11-16, 18, 23, 24, 26, 27, 29, 30-32, 35, 48, 40, 43, 44, and 47 fails to allege that *Adams* teaches Applicant's claimed "***logic configured to determine an expected value for the at least one characteristic for the plurality of solder joints responsive to low frequency change in a solder joint characteristics across the device***." Applicant submits that the statement of the rejection does not allege that the cited art references teach this element because this element is not found in the cited references.

For at least this reason, the proposed combination of *Adams* in view of *Cannon* does not disclose, teach, or suggest Applicant's claimed computer program to one skilled in the art. Consequently, claim 31 is allowable for at least the reason that the proposed combination of references does not disclose, teach, or suggest

Applicants' each element of Applicant's claimed invention. Accordingly, the rejection of claim 31 should be withdrawn.

Because independent claim 31 is allowable, dependent claims 32-47, which depend directly or indirectly from allowable claim 31, are also allowable. *See In re Fine, supra.* Accordingly, Applicant respectfully requests that the rejection of claims 31, 32, 35, 38,40, 43, 44, and 47 be withdrawn.

III. Claim Rejections Under 35 U.S.C. §103(a) - Claims 6, 7, 17, 19, 33, 34, 39, 41, 42, 45, and 46

The Office Action indicates that claims 6, 7, 17, 19, 33, 34, 39, 41, 42, 45, and 46 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Adams* in view of *Cannon* as applied to claims 1, 14, and 31 above, in further view of U.S. Patent No. 5,780,866 to Yamamura *et al.*, hereafter *Yamamura.*

Applicants respectfully traverse the rejection of claims 6, 7, 17, 19, 33, 34, 39, 41, 42, 45, and 46 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

As shown above, the proposed combination of *Adams* in view of *Cannon* as applied to claims 1, 14, and 31 fails to suggest all features of the claimed invention to one of ordinary skill in the art. Consequently, even if *Yamamura* teaches all that the statement of the rejection alleges, the proposed combination fails to suggest all features of Applicant's claimed invention to one of ordinary skill in the art.

Consequently, claims 6, 7, 17, 19, 33, 34, 39, 41, 42, 45, and 46, which depend from allowable independent claims 1, 14, and 31 are allowable over the proposed combination of references. *See In re Fine, supra.* Accordingly, Applicant respectfully requests that the rejection of claims 6, 7, 17, 19, 33, 34, 39, 41, 42, 45, and 46 be withdrawn.

IV. Claim Rejections Under 35 U.S.C. §103(a) - Claims 9, 10, 21, and 22

The Office Action indicates that claims 9, 10, 21, and 22 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Adams* in view of *Cannon* as applied to claims 1 and 14 in further view of U.S. Patent No. 4,792,683 to Chang *et al.*, hereafter *Chang.*

Applicants respectfully traverse the rejection of claims 9, 10, 21, and 22 for at least the reason that the proposed combination of references fails to disclose, teach, or suggest each element in the claims.

As shown above, the proposed combination of *Adams* in view of *Cannon* as applied to claims 1 and 14 fails to suggest all features of the claimed invention to one of ordinary skill in the art. Consequently, even if *Chang* teaches all that the statement of the rejection alleges, the proposed combination fails to suggest all features of Applicant's claimed invention to one of ordinary skill in the art.

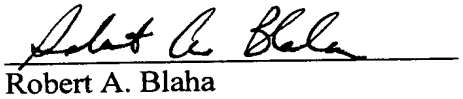
Consequently, claims 9, 10, 21, and 22, which depend from allowable independent claims 1 and 14 are allowable over the proposed combination of references. *See In re Fine, supra.* Accordingly, Applicant respectfully requests that the rejection of claims 9, 10, 21, and 22 be withdrawn.

CONCLUSION

In summary, Applicant respectfully submits that presently pending claims 1-47 are allowable and the present application is in condition for allowance. Accordingly, a Notice of Allowance is respectfully solicited. Should the Examiner have any comments regarding the Applicant's response or intends to dispose of this matter in a manner other than a Notice of Allowance, Applicant requests that the Examiner telephone Applicant's undersigned attorney.

Respectfully submitted,

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.

By: 
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